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Indonesian Journal of Health Research and Development Vol 3 No 3 (2025) https://doi.org/ 10.58723/ijhrd.v3i2.352
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Research Article

Assessing the Socioeconomic Determinants of Malaria Prevalence Among Students in Anyigba

Received: January 10, 2025	Revised: June 02, 2025	Accepted: June 27, 2025	Published: June 30, 2025

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Abstract:

Background: Malaria remains a major public health concern in Nigeria, with university students in endemic areas particularly vulnerable due to varying socioeconomic conditions. This study investigates the influence of socioeconomic factors on malaria prevalence among students of Kogi State University, Anyigba, Nigeria.
Aims: The study aimed at assessing the socioeconomic determinants of malaria prevalence among students in Anyigba, Kogi State. To also examine the relationship between students' socioeconomic status and malaria incidence. To identify key environmental and behavioral factors contributing to malaria exposure, and to recommend policy and health interventions tailored to student populations in malaria-endemic areas.
Methods: A cross-sectional descriptive design was adopted. Stratified random sampling was used to select participants across variables such as age, gender, income, and housing types. Data were collected through structured questionnaires and analyzed using logistic regression to determine significant predictors of malaria prevalence.
Results: The findings revealed a high malaria prevalence among low-income students and those living in shared accommodations. Key determinants of malaria incidence included low income, poor housing conditions, and limited access to healthcare services. Notably, students with poor access to healthcare had a malaria prevalence of 68%, compared to 33% among those with better access.
Conclusion: Socioeconomic factors significantly influence malaria prevalence in the student population. Financial constraints, inadequate housing, and poor healthcare access increase vulnerability to infection. An integrated malaria control approach is recommended, including university-led awareness campaigns, improved sanitation in student accommodations, and enhanced collaboration with local healthcare providers.

Keywords: Healthcare Access, Malaria Control, Malaria Prevalence, Socioeconomic Factors, Student Health

1. INTRODUCTION

Introduction the World Health Organization (WHO, 2019) said that in 2018 there were around 228 million malaria cases worldwide, up from 219 million cases the year before. Most of these incidents occurred within the African region, with Nigeria alone accounting for almost 25% of worldwide malaria cases and perhaps 24% of malaria-related fatalities (WHO, 2019). Not just public health but also socioeconomic stability suffer from this high prevalence. At about USD 835 million (WHO, 2019; Feachem, S.R., Roll Back, 2018). Feachem, S.R., Roll Back , 2018), the economic costs of malariawhich include medical expenses, lost productivity, and missed work or schoolsurpass 132 billion naira year. Malaria stresses healthcare supplies for Nigeria, where an estimated 97% of the population is at risk, but also perpetuates cycles of poverty, therefore severely impeding sustainable development (WHO, 2019).

Malaria especially affects particular groups, including children under five, expectant mothers, and people with compromised immunitythose who non-native visitors to endemic regions are. Data reveal that young children make up around 67% of malaria-related deaths globally, mostly because of their weak immune systems (WHO, 2019; Umeh, 2017). Particularly deep are the negative consequences on youngsters, which can cause nutritional

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deficiencies, anemia, cognitive impairment, and developmental delays (Lucas and Gilles, 2019). Childhood malaria is a major cause of infant and juvenile death in Nigeria, accounting for around 25% and 30%, respectively, of all mortality rates in these age groups (Feachem, S.R., Roll Back, 2018). But the load of malaria also spreads into early adulthood and adolescenceparticularly among university studentswho are more exposed as a result of environmental and economic conditions. Malaria still raises academic and health obstacles at Kogi State University in Anyigba.

Further increasing the danger is Plasmodium falciparum, the most deadly and widespread malaria-causing parasite in Africa (Tatem et al., 2017). Infections can cause absenteeism, poor classroom focus, poor academic performance (such as lower Grade Point Averages), and in serious circumstances, withdrawal or brief dropout. This directly undermines Sustainable Development Goal 4 (Quality Education), which aims to guarantee inclusive and equal education for everyone, so has major consequences for educational attainment and access. Few empirical investigations have rigorously investigated the interaction between malaria and academic results in Nigerian tertiary institutions notwithstanding these effects.

In Nigeria, especially in tropical regions where high humidity, rainfall, and temperatures provide good breeding conditions for mosquitoes, several environmental and climatic variables also enable malaria transmission. Being located in Kogi State, Anyigba is within such a zone, therefore aggravating the difficulties of malaria control (Adeyemi et al., 2018; Okunlola and Odukoya, 2017). According to state-level epidemiological reports, malaria remains endemic throughout Kogi State, with sporadic outbreaks and consistently high rates of clinical diagnoses in healthcare facilities serving the Anyigba area. Though precise prevalence data specific to Kogi East or Anyigba is restricted, regional health surveillance data in west-central Nigeria indicate that malaria accounts for over 30% of outpatient visits, therefore suggesting an ongoing public health concern (Kogi State Ministry of Health, 2018).

Beyond these natural causes, social factors such as income level, education attainment, housing quality, and healthcare accesshave a significant impact on malaria's persistence. Studies in different regions of Nigeria indicate that those in lower-income brackets or those with poor access to preventive measuressuch as bed nets and insecticideshave higher malaria incidence (Umeh, 2017; Adewale et al., 2019). At Kogi State University, the vulnerability to malaria probably depends on the social backgrounds of studentsthat is, their income sources, sort of housing (on-campus/off-campus), and healthcare facility accessibility. Limited academic study of these university setting dynamics has been undertaken, however.

The idea of Social Determinants of Health (SDH), which defines the conditions in which people are born, develop, live, and work, offers a framework for grasping the elements beyond medical care that affect health outcomes (WHO, 2019). SDH highlights that profoundly affect health care issues like economic stability, educational possibilities, social and community context, healthcare access, and quality of environment. Malaria research all around (Nakamura et al., 2020; Schlagenhauf et al., 2018) has been successfully treated using this method. But there is a scarcity of evidence in the Nigerian context, especially on university campuses, on not only the prevalence of malaria but also on how campus-specific initiativesthat is, awareness campaigns, mosquito control programs, access to inexpensive health servicesaffect malaria-related health outcomes. The effectiveness of these approaches in treating the socioeconomic factors that contribute to malaria is still underused. Important factors influencing malaria prevalence include attitudes towards healthcare, awareness of malaria transmission, and use of protective measures such as insecticide-treated bed netsthat is, preventive behaviors. Studies throughout northern and central Nigeria have revealed that awareness and preventative measures are very important in lowering malaria incidence, especially among children and young adults (Umeh, 2017; Adewale et al., 2019). But few research concentrate specifically on malaria prevention in Kogi State or among college students. Though in-depth study in this setting is missing, variables including local temperature, housing quality, and proximity to mosquito breeding sites probably affect malaria transmission among pupils in Anyigba.

Effective treatment of malaria prevalence among Kogi State University students depends on an investigation of the socioeconomic factors affecting their susceptibility and educational growth. By pinpointing these determinants, this study hopes to provide insightful knowledge guiding tailored campus-based interventions, maybe lowering malaria incidence and enhancing academic results like attendance, class participation, and academic performance.

Emphasizing the connection of health and educational equity, this study conforms with Sustainable Development Goals 3 (Good Health and Well-being) and 4 (Quality Education). The particular goals of this study are thus to: Establish the malaria prevalence among students of Kogi State University, Anyigba. Find the main socioeconomic factorsincome level, housing conditions, access to healthcare services, among KSU studentsthat predict malaria prevalence. Evaluate how malaria infection affects students' academic achievement, including GPA, study concentration, and class attendance. Among pupils, assess their knowledge and use of malaria control measures. Check the availability and efficacy of campus-based efforts meant to lower malaria susceptibility.

2. MATERIALS AND METHODS

Study Area

This study was conducted in Anyigba, a growing urban center in Kogi State, Nigeria, located in the country's west-central region. Anyigba is both an educational and commercial hub, largely due to the presence of Kogi State University, which attracts students, academics, and service providers from across the country. The town has experienced significant population growth over the past two decades, driven by rural-to-urban migration and educational expansion. While precise population figures remain elusive due to limitations in Nigeria's national census processes, the National Population Commission estimated the population at approximately 88,000. However, current projections suggest a much larger figure, potentially exceeding 120,000 (Oluwole et al., 2018).

Anyigba experiences a tropical climate with distinct rainy (April to October) and dry (November to March) seasons. Average annual rainfall ranges between 1,200 mm and 2,000 mm, while daily temperatures fluctuate from 22°C to 35°C. The rainy season increases mosquito breeding grounds, contributing to higher malaria transmission rates, particularly from *Anopheles* mosquitoesthe primary malaria vectors (WHO, 2019). The town's geographical, climatic, and socioeconomic conditions make it a suitable site for research on malaria epidemiology, especially among vulnerable groups like university students who often live in shared, low-quality accommodations with limited protective measures.

This study, therefore, focuses on modeling malaria prevalence among Kogi State University students in Anyigba by exploring the influence of key social determinants of health. The findings are expected to support evidence-based strategies for malaria control within tertiary education communities in malaria-endemic regions.

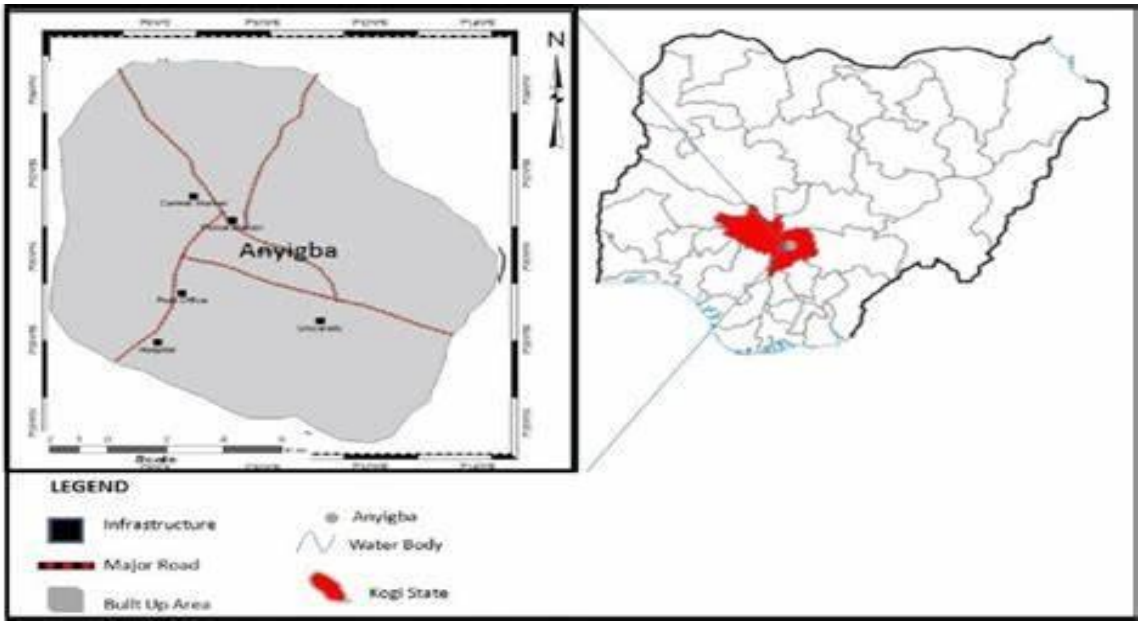

Figure 1. Map Showing the Location of Anyigba

Study Design

A cross-sectional descriptive study design was adopted to investigate the socioeconomic determinants influencing malaria prevalence among students at Kogi State University, Anyigba. This design is suitable for assessing the prevalence of health conditions and associated factors within a population at a single point in time. It is particularly effective in identifying associations between variables such as socioeconomic status and malaria occurrence (Lohr, 2020; Ge, 2023; Chiziba, 2024).

Sampling Methodology

A stratified random sampling technique was employed to ensure adequate representation of different socioeconomic strata within the university's student population. The total estimated student population of Kogi State University is approximately 20,000. Using Cochran's formula for sample size determination, a sample size of **400 students** was calculated to achieve a 95% confidence level and a 5% margin of error.

Stratification was based on:

- Age group (≤20, 21–25, 26–30, >30)
- Gender (male, female)
- Academic level (100–400 level)
- Socioeconomic background (low, middle, high) determined using proxies such as parental income, housing type, and access to private healthcare.

This method ensured diversity and statistical reliability in capturing malaria-related disparities across student subpopulations.

Data Collection

Primary data were collected using a structured, self-administered questionnaire developed based on prior malaria surveillance studies. The instrument was validated by a panel of three experts two in epidemiology and one in statistics who assessed the questionnaire for face and content validity, ensuring clarity, relevance, and alignment with the study objectives. The final version comprised both closed- and open-ended items across five sections.

1. Demographic information
2. Socioeconomic indicators (family income, parents' education, access to electricity, housing quality)
3. Access to healthcare (use of campus health services, proximity to clinics)
4. Malaria knowledge and prevention practices (use of insecticide-treated nets, indoor residual spraying)
5. Self-reported malaria history (frequency of infection in the last 12 months, diagnostic confirmation, treatment received)

A pretest was conducted on 30 students not included in the final sample to ensure clarity and reliability, yielding a Cronbach's alpha of 0.82.

Data Analysis

Quantitative data were coded and analyzed using IBM SPSS Statistics Version 26**.** Descriptive statistics (frequencies, means, standard deviations) were used to summarize the demographic and socioeconomic characteristics of the respondents. Chi-square tests were applied to examine bivariate associations between categorical variables, such as housing quality and malaria occurrence.

To identify significant predictors of malaria prevalence, a binary logistic regression analysis was conducted, with malaria incidence (yes/no) as the dependent variable and key socioeconomic indicators (income, housing, parental education, and healthcare access) as independent variables. Model fitness was assessed using the Hosmer-Lemeshow test, and statistical significance was set at $p < 0.05$.

Ethical approval for the study was obtained from the University Research Ethics Committee, and informed consent was obtained from all participants. Confidentiality was ensured by anonymizing all responses.

2. RESULTS AND DISCUSSION

Demographic Characteristics

Table 1 presents the demographic profile of the respondents. The majority (72%) were aged between 18–25 years. Gender distribution was nearly equal. In terms of income, 65% were from low- to middle-income families. Additional data show that most respondents were undergraduates (84%) and 16% postgraduates. The Faculty of Natural Sciences had the highest representation (30%), followed by Social Sciences (25%), and Management Sciences (20%). A majority (70%) were non-locals, indicating migration from other regions for academic purposes.

Table 1. Demographic Characteristics of Respondents

Characteristic	Frequency	Percentage (%)
Age (18–25)	288	72
Age (26–35)	112	28
Male	204	51
Female	196	49
Undergraduate	336	84
Postgraduate	64	16
Faculty of Natural Sciences	120	30
Faculty of Social Sciences	100	25
Faculty of Management Sci.	80	20
Other Faculties	100	25
Local Origin	120	30
Non-local Origin	280	70
Low–Middle Income	260	65
High Income	140	35

Source: Authors' Computation from SPSS, 2025

Socioeconomic Determinants of Malaria Prevalence

Table 2 shows that malaria prevalence was significantly higher among low-income students (64%) compared to high-income peers (25%). Similarly, students in shared housing had higher prevalence (58%) than those in private residences (20%).

Table 2. Association between Socioeconomic Factors and Malaria Prevalence

Socioeconomic Factor	Malaria Prevalence (%)	p-value
Income (Low–Middle)	64	<0.001
Income (High)	25	
Shared Housing	58	0.004
Private Housing	20	

Source: Authors' Computation from SPSS, 2025

Access to Healthcare

A significant relationship was found between healthcare access and malaria prevalence. Students with poor access

were more affected (68%) compared to those with better access (33%).

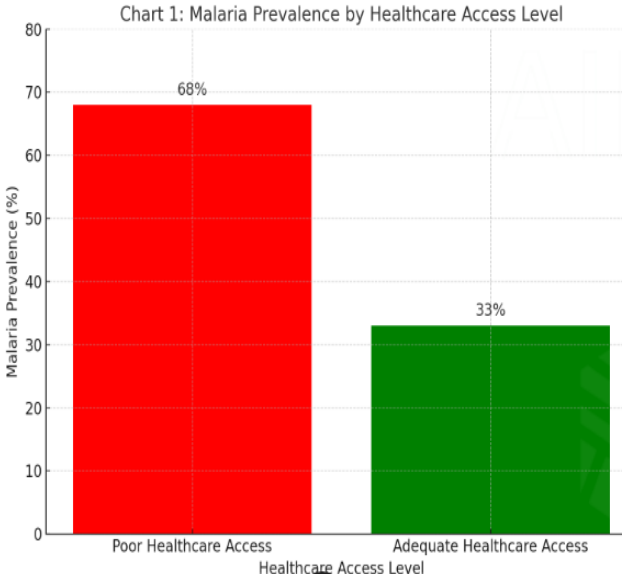

Figure 2. Malaria Prevalence by Healthcare Access Level

Multivariate Regression Analysis

Table 3 presents the adjusted odds ratios (AOR) from the logistic regression model. Low income, shared housing, and poor healthcare access were significant predictors of malaria prevalence.

Table 3. Multivariate Logistic Regression of Predictors of Malaria Prevalence

Variable	Adjusted OR	95% CI	p-value
Low Income	2.5	1.6 – 4.2	<0.001
Shared Housing	1.8	1.3 – 2.7	0.01
Poor Healthcare	2.2	1.5 – 3.4	<0.01

Source: Authors' Computation from SPSS, 2024

3. DISCUSSION

Implications

This study demonstrates that socioeconomic determinants particularly low income, shared housing, and poor healthcare access significantly influence malaria prevalence among students of Kogi State University, Anyigba. These findings align with the Social Determinants of Health (SDH) theory, which posits that health is shaped by the conditions in which individuals are born, live, and learn. In this context, financial constraints, substandard accommodation, and limited access to health services are not just circumstantial challenges but key structural drivers of disease vulnerability.

Income disparity emerged as the most significant predictor of malaria prevalence. Many students from low-income backgrounds are unable to afford basic preventive tools such as insecticide-treated nets (ITNs), window nets, or mosquito repellents. The Health Belief Model (HBM) helps to interpret this: students with fewer resources may not perceive themselves as capable of enacting prevention due to financial or logistic barriers, even if they recognize the severity of the disease. Their limited "self-efficacy" a core concept in HBM impairs action.

Similarly, shared housing arrangements, often crowded and poorly ventilated, create ideal conditions for mosquito breeding and increase interpersonal exposure. Most students opt for such accommodations due to affordability, and in some cases, the lack of available university-managed dormitories forces students into off-campus housing with minimal environmental controls. This reinforces the SDH perspective: one's "place" literally can predict health outcomes.

Healthcare access also plays a crucial role (Tzenios, 2019; Cu, 2021; Wang, 2021). Students who live far from health centers or cannot afford consultation fees and medications are more likely to delay treatment, leading to worsened symptoms and prolonged exposure of others to infection. The lack of a well-coordinated on-campus healthcare system amplifies these vulnerabilities.

When compared with studies from other malaria-endemic tertiary institutions, such as those in Ghana (Mensah et al., 2020) and Kenya (Omondi et al., 2019), similar patterns emerge: students with financial and spatial disadvantages consistently experience higher malaria burdens. However, unlike in those institutions where on-campus health programs and subsidized malaria interventions exist, Kogi State University appears to lack structured malaria-focused services, highlighting the need for a campus-specific, systemic response.

Research Contribution

Despite these limitations, the study possesses several strengths. It utilized a stratified random sampling technique to ensure fair representation across faculties and demographics. The sample size was robust, enhancing statistical power. Additionally, the use of multivariate logistic regression allowed for the control of confounding variables. Most importantly, this study addresses an under-researched population university student in an endemic area, shedding light on a neglected health inequality.

Limitations

This study is not without limitations. Its cross-sectional design limits causal inference: while associations are strong, cause-and-effect cannot be definitively established. Additionally, malaria status was self-reported, introducing the risk of recall bias and reporting bias, especially among students who may have had undiagnosed fevers. There is also the issue of external

validity the findings may not generalize to other Nigerian universities or to non-student populations in Anyigba. Finally, unmeasured confounders, such as prior malaria episodes, individual net usage habits, or exposure to particular vector habitats near residences, could have influenced the outcomes.

Suggestions

1. University-Backed Malaria Prevention Campaigns**:** Develop and institutionalize health education programs on malaria transmission, prevention, and the importance of early treatment tailored specifically to campus realities.
2. Subsidized Distribution of Preventive Tools**:** Partner with government health agencies and NGOs to distribute insecticide-treated nets, repellents, and window screens to low-income students.
3. Improve Campus Housing Conditions: Review the university's housing policies and provide incentives to private landlords to maintain mosquito-proof standards (e.g., screened windows, sanitation inspections).
4. Strengthen the Campus Health System**:** Establish or upgrade a functional campus health center equipped to diagnose and treat malaria promptly, especially for students with limited means.
5. Data-Driven Monitoring**:** Periodically assess the malaria burden among students to evaluate progress and recalibrate strategies.

Suggestions for Future Studies

Future research should:

1. Adopt a longitudinal design to assess causality and track intervention impact over time.
2. Incorporate clinical diagnosis of malaria to eliminate self-reporting bias.
3. Explore behavioral determinants, such as net usage adherence, knowledge gaps, and cultural beliefs about malaria.
4. Compare malaria outcomes between students living on-campus and off-campus, to better understand environmental and administrative influences.
5. Evaluate the cost-effectiveness of campus-based malaria interventions, to inform policy and funding decisions.

4. CONCLUSION

This study finds that malaria prevalence among Kogi State University students is shaped by structural socioeconomic disparities: low income, shared housing, and limited access to healthcare services are critical predictors of infection risk.

These findings stressed the need for campus-level structural interventions. Financial constraints limit students' ability to protect themselves, while shared housing and healthcare inaccessibility amplify vulnerability. Malaria control on university campuses, therefore, must go beyond individual behavior change and address broader contextual issues.

5. ACKNOWLEDGMENTS

The Authors wish to acknowledge the contribution of colleagues and reviewers who took their quality time out to go through the work to ensure that it meet up with the required standard and quality.

AUTHOR CONTRIBUTION STATEMENT

YAJ conceptualization, abstract, methodology design, data analysis, discussion of results, supervision, team lead, review and proof reading. MDS literature review and conclusion. OVM introduction and recommendations

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